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presented in attractive form and for the beginner is one of the best books of its kind with which I am acquainted.

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SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Zoology, Volume III., No. 4 (December, 1906), contains the following papers: 'The Physiology of Regeneration,' by T. H. Morgan. Experiments on salamanders, earthworms and fish show that the rate of regeneration in a posterior direction is more rapid the further the cut surface from the original end. In other words, the more of the old part removed, the more rapid the new part regenerates. Other experiments show that this is not due to food conditions, but that the rate depends on a formative factor. It is suggested that it is the relation of tension in the old and the new part that is a controlling factor in regeneration and growth. 'Hydranth Formation and Polarity in Tubularia,' by T. H. Morgan. Experiments on tubularia show that the polarity is an expression of the direction of the gradation of the differentiated materials. The greater the differentiation in one direction the longer the road that must be traveled to produce a different kind of structure. The gradation acts as a physical factor in development, determining the tension relations in the old and new part. 'Studies on the Development of the Starfish Egg,' by D. H. Tennent and M. J. Hogue. This paper describes the parthenogenetic development of the starfish egg following treatment with CO_2 , the phenomena occurring as a result of first treating the egg with CO_2 and later fertilizing it, and the results of subjecting fertilized eggs to the influence of CO_2 . 'Some Experiments on the Developing Ear Vesicle of the Tadpole with Relation to Equilibration,' by Geo. L. Streeter. A study of the normal development of the function of equilibration in the tadpole, and the variations produced by removal and transplantation of the ear vesicle during the early larval period. 'The

Relation between Functional Regulation and Form Regulation,' by C. M. Child. The organism is to be regarded as primarily a dynamic or functional complex, and structure and form are visible expressions of dynamic conditions: consequently the regulation of form and structure is fundamentally a dynamic or functional regulation and only as such can its phenomena be satisfactorily interpreted. 'Study of the Spermatogenesis of *Coptocycla Aurichalcea* and *Coptocycla Gut-tata*, with especial reference to the Problem of Sex Determination,' by W. N. Nowlin. An investigation of two species of beetles revealed the presence of an unequal pair of chromosomes, the so-called 'idiochromosomes' of Wilson, which, we have strong evidence for believing, transmit or determine the character of sex. The small one invariably occurs in the male somatic cells and represents the recessive form of the female character; the large one in the female somatic cells and bears the male character. 'Torsion and Other Transitional Phenomena in the Regeneration of the Cheliped of the Lobster (*Homarus Americanus*),' by Victor E. Emmel. A comparison of the regenerative with the ontogenetic method of development. 'The Influences of Gases and Temperature on the Cardiac and Respiratory Movements in the Grasshopper,' by Eulalia V. Walling. The influences of gases and temperature on the respiratory and cardiac activities were found to be practically the same on segments of the isolated heart and isolated respiratory centers as in the normal grasshopper. Moreover, it was found that these activities may continue in such specimens as long as four days in an atmosphere of pure hydrogen.

DISCUSSION AND CORRESPONDENCE

NORTON'S ELEMENTS OF GEOLOGY

THE review of Norton's 'Elements of Geology,' which appears in a recent number of SCIENCE, Vol. 24, p. 590, prompts one to repeat the suggestion recently made, that the legitimate function of a review in such a periodical as SCIENCE is to give to the reader an accurate impression of the general character of the work, both as to the ground which

it covers, and as to the way in which it covers it.

It may be doubted whether the review in question performs this function. It leaves the impression that the book reviewed is, on the whole, a pretty poor sort of book, when it is really an excellent one. It is not beyond criticism—no book is. The reviewer indicates some of the weak points, and seems to regard as weaknesses several of the strong features. A number of the criticisms might be appropriate if the book were intended primarily as a reference work, but they hardly seem applicable to a book which is intended as a text-book for beginners. An excellent text-book is not necessarily the best book for reference. The classification of subject matter for ideal books of the two types would be, in many respects, very different. In a text-book, it is certainly no weakness that one must 'go to three or four separate parts of the book' 'to learn about sandstones,' though this might be a weakness in a book of reference. The reviewer's attitude leads one to suspect that he uses books for reference only, not as texts, and that this has influenced his point of view.

In spite of the reviewer's statement, the diagrams of the book are, on the whole, excellent and readily understood, and the notes and questions which accompany them are to be especially commended.

The criticism that the book is largely physiographic is nothing against it, and when we remember the class of pupils for whom the book is intended—high-school pupils—the absence of 'references to other books' is certainly much less serious than the reviewer seems to think.

The statement that 'the bog ore, silicious and phosphatic deposits that get a brief mention in Le Conte are not here referred to' leads one to make the further suggestion that a book should be carefully read before detailed criticism of this sort is indulged in, for bog ore is mentioned on page 53 and silicious deposits on pages 52, 178 and 261. Other similar criticisms of the reviewer might be cited. The omission of such subjects as phosphatic deposits is to be commended in a book of this type, for it must be remembered that most

elementary books treat of too many, not too few, topics. In the writer's judgment the book takes rank at once among the best of the elementary text-books on geology.

H. H. BARROWS

UNIVERSITY OF CHICAGO,

December 10, 1906

SPECIAL ARTICLES

THE SIGNIFICANCE OF THE GRASPING ANTENNÆ OF HARPACTICOID COPEPODS

THE character of the secondary sexual differentiation of the first pair of antennæ of male free-swimming Copepoda and the associated manner of copulation divide these copepods into two well-marked groups: one group in which only one antenna forms a grasping organ and in which the act of copulation is relatively short; and a second group in which both antennæ are grasping organs by which the male holds the female for a long time in copula. The duration of this union is shown by two records: one of an apparently normal pair of *Harpacticus uniremis* which remained in copula at least twenty-nine and possibly thirty-eight hours; another of a pair of undetermined genus which remained in copula eight days, at the end of which both male and female died. The persistence of the male is shown by the fact that he can be torn apart, but still maintains his hold until the paralysis of death frees the female. Claus¹ observed that the males of the Peltidiæ were found in copula with females one molt from maturity and speculated upon the meaning of the phenomenon without arriving at a satisfactory conclusion.

During the spring of 1906, a large number of copulating pairs of *Harpacticus uniremis* and *Tachidius littoralis* appeared in the tow taken in Narragansett Bay and a number of pairs were separated in watch glasses for observation. We were fortunate in examining a pair of the first species just when the female was beginning to molt. The ecdysis occupied about five minutes and as the slough came away, the male, which had been holding the female by the hinder edge of the carapace,

¹ Claus, C., 'Die freilebenden Copepoden,' Leipzig, 1863, p. 71.